CLAIMS

What is claimed is:

1. A method for making a silicon micro-mold, comprising the steps of:

providing a silicon substrate, said substrate having top and bottom surfaces and a thickness therebetween;

forming an electrically conductive layer onto said bottom surface;

forming a photoresist layer onto said top surface;

aligning an image patterning mask onto said photoresist layer, wherein said mask having closed portions for blocking light and open portions for allowing light to pass through;

directing a source of broadband light onto said mask thereby exposing portions of said photoresist layer lying beneath said mask open portions;

removing said mask;

developing said photoresist layer so that a portion of said photoresist is removed to expose areas of said silicon substrate, and a portion of said photoresist remains as a protective etch barrier; and

anisotropically etching said exposed areas of said silicon substrate through said substrate thickness to said electrically conductive layer thereby providing a plurality of etched trenches comprising substantially vertical walls surfaces and floor surfaces comprising said electrically conductive layer; and

removing said remaining photoresist;

2. The method of claim **1**, further including the step of oxidizing the surfaces of the silicon substrate after the step of removing said photoresist.

3. The method of claim **1**, wherein the step of providing a silicon substrate comprises providing a silicon substrate that is a industry standard silicon wafer.

4. The method of claim **1**, wherein the step of depositing said metal layer includes depositing a metal selected from the group consisting of the noble metal listed in New IUPAC Group Numbers 9, 10, or 11 of the Period Table of elements and alloys thereof.

5. The method of claim **1**, wherein the first step of depositing comprises depositing a metal layer by particle or thermal vapor deposition.

6. The method of claim **1**, wherein said step of deposition includes depositing a layer of chromium followed by depositing a layer of gold.

7. The method of claim **1**, wherein the step of forming a photoresist layer onto said substrate comprises spin-coating a Novolak photoresist layer on said substrate.

8. The method of claim **7**, wherein the photoresist layer is about 2 micron thick.

9. The method of claim **1**, wherein the step of aligning an image patterning mask comprises aligning a positive trace image patterning mask.

10. The method of claim **1**, wherein the step of aligning an image patterning mask comprises aligning a negative trace image patterning mask.

11. The method of claim **2**, wherein the first step of depositing comprises depositing a metal layer by particle or thermal vapor deposition or by sputtering.

12. The method of claim **2**, wherein the step of depositing said metal layer includes depositing a metal selected from the group consisting of the noble metal listed in New IUPAC Group Numbers 9, 10, or 11 of the Period Table of elements and alloys thereof.

13. The method of claim **12**, wherein said step of depositing said metal layer includes depositing a layer of gold.

14. A silicon mold for preparing metal micro-components, comprising:

a silicon substrate having a thickness, and substantially parallel top and bottom surfaces, said substrate having at least one pattern etched into said top surface comprising one or more etched channels or shapes wherein said channels or shapes comprise substantially vertical walls and terminate in substantially flat floor surfaces, said channels or shapes having features with lateral dimensions of less than 1 micron;

a silicon oxide release layer covering said substrate surfaces; and

an electrically conductive plating surface disposed at said flat floor surfaces.

15. The micro-mold of claim **14**, wherein said electrically conductive plating surface comprises a metal layer consisting essentially of gold.

16. The micro-mold of claim **14**, wherein said electrically conductive plating surface comprises one or more of the metals selected from the group consisting of the Transition metals listed in New IUPAC Groups 4 – 11 of the Periodic Table of Elements, tin and aluminum, and alloy thereof.

17. The micro-mold of claim **16**, wherein said electrically conductive plating surface comprise a first metal layer consisting essentially of chromium.

18. The micro-mold of claim **14**, wherein said electrically conductive plating surface comprises one or more thin thermal or particle vapor deposited metal layers.

19. The micro-mold of claim **14**, wherein said electrically conductive plating surface is deposited by sputter deposition.

20. The micro-mold of claim **18**, wherein said second metal deposit is deposited by electroplating.